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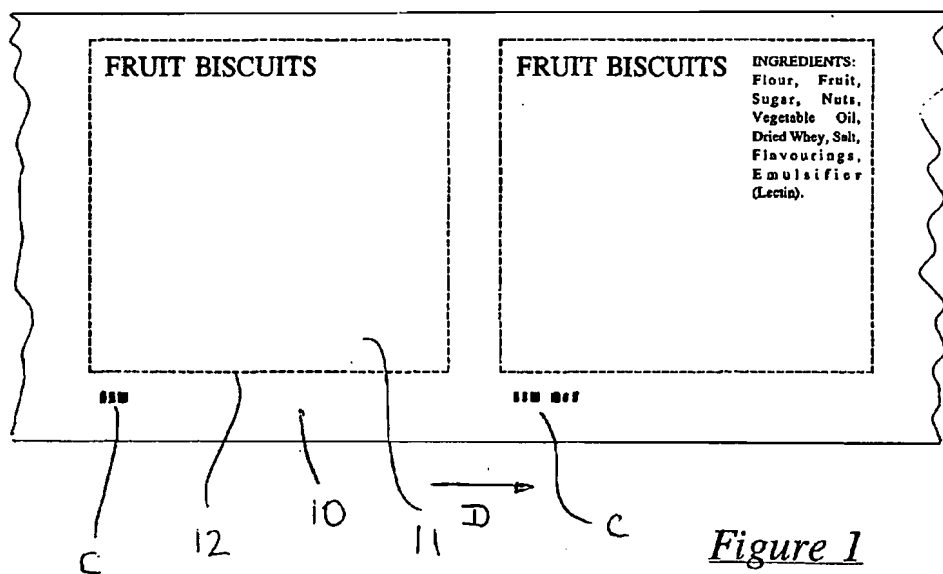
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(54) Print monitoring

(57) A printing apparatus comprises a printing press having a plurality of printing plates for printing respective portions of an image onto a substrate 10. Each printing plate carries a unique identification mark C that is printed onto respective different portions of the substrate, such that the printed marks C combine to form a bar-code or other symbol. The apparatus further comprises

means for comparing the complete symbol C of a correctly printed image with the final printed image on the substrate, which is obtained by a bar-code reader or video camera of the apparatus. In use, if the bar-code does not match the stored code, say because an incorrect plate is present, an error signal is produced by the apparatus to inhibit the press.



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Description

This invention relates to monitoring printed matter in order to ensure that the printed image is correct or complete.

Food and drinks packaging generally comprises a label, carton, can or bag which is printed with decorative matter as well as with text that describes the product and its nutritional contents. Typically the labels etc. are multicoloured and thus the printing press comprises a plurality of printing plates, one for each colour.

Food and drinks manufacturers often produce different varieties of the same product, which have visually similar packaging in order to maintain a brand identity.

Typically, the printing plate which prints the product description is different from the plate which prints the list of ingredients and/or nutritional information. Obviously, care has to be taken that all packaging is printed with the correct information and thus each job is carefully examined at the start of every print run, in order to make sure that the correct image is being printed.

During printing there is often a need to quickly change one or more of the plates and here there is a danger that the wrong plate could be inserted, especially when there are several visually similar plates belonging to different varieties of the same product.

People with special dietary needs and allergies pay great attention to the list of ingredients and/or nutritional information on products. Therefore, there is a danger that they could inadvertently buy a product which they should not eat, if the product packaging contains the wrong information. Obviously, this could have potentially disastrous consequences.

We have now devised a printing apparatus which alleviates the above-mentioned problem.

In accordance with this invention, there is provided a printing apparatus comprising a printing press having a plurality of printing plates for printing respective portions of the image being printed onto a substrate, each plate carrying a unique identification mark that is printed onto the substrate, the apparatus further comprising monitoring means for monitoring the identification marks printed onto the substrate by each plate, memory means arranged to store the identification marks corresponding to the image intended to be printed, means for comparing the monitored marks with the stored marks and means for producing an error signal when the marks do not compare.

In use, when the printer sets up the press he has to enter the predetermined identification marks corresponding to the image that is to be printed into the memory means. The identification marks printed by each plate are compared with the corresponding stored marks, so as to ensure that the correct image is being printed. If an incorrect plate is present in the press, at least one of the monitored marks will not be the same as the stored marks and an error signal will be produced.

Preferably the error signal is arranged to inhibit the

press and/or produce an audible and/or visible alarm signal.

Preferably the identification mark on each plate is arranged such that the printed marks form a series on the substrate.

Preferably the series of marks form a bar-code.

Preferably the monitoring means comprises a video camera or bar-code reader.

It will be appreciated that the marks in the series are different colours because they are printed by different plates. Thus, the video camera is preferably monochrome, so that it operates independently of colour.

An embodiment of this invention will not be described by way of example only and with reference to the accompanying drawings, in which:

FIGURE 1 is a plan view of a web of food packaging labels which have been partially printed by an apparatus in accordance with this invention; and FIGURE 2 is a diagram to illustrate how the successive marks printed by each plate of the apparatus form a bar-code.

Referring to Figure 1 of the drawings, there is shown a paper web 10 comprising a series of labels 11 arranged successively along its length. Perforations 12 are formed around the labels 11, so that they can be removed from the web 10.

The labels are to be printed with multiple colours and this requires a plurality of printing plates, one for each colour. The printing plates are arranged to successively print onto the labels as the web moves in direction D through the printing press.

In the example shown, the web 10 initially travels under a first plate that is arranged to print the product description, e.g. fruit biscuits, onto the labels in a light blue colour. The web then advances to the second plate, where the labels are printed with the list of ingredients in a dark blue colour. The web then proceeds through successive printing stages where text and decorative matter are added to the labels in the same or other colours. The arrangement as hereinbefore described in the same as a conventional printing arrangement.

It is often necessary to replace printing plates during a print run. A disadvantage of this is that it is easy to insert an incorrect plate, especially when the plates look very similar. Thus, in the example shown, the second plate containing the list of ingredients could inadvertently be replaced with the plate containing the list of ingredients for say the cream biscuits of the same manufacturer, thereby dangerously hiding the fact that the fruit biscuits actually contain nuts.

Referring to Figure 2 of the drawings, in order to overcome this problem and in accordance with this invention, each printing plate contains a unique binary-encoded character in the form of thin and thick parallel lines. The position of the character on each plate varies with respect to a reference point on the label, such that

the printed characters successively combine to form a bar-code symbol. In the example shown, there are six printing plates respectively arranged to print light blue, dark blue, blue, dark blue, red and red.

Referring again to Figure 1 of the drawings, preferably the codes C are printed onto a waste area of the web which does not form part of the label, so that the bar-code does not affect the final appearance of the label.

In use, the printer sets up the printing press by inserting each of the printing plates. When all of the plates are printing in register a code number is obtained from the job sheet: this code number is known to correspond with the correct code for the job being printed.

The press is then started and a monochrome video camera is directed at the web on the downstream side of the last printing plate. The camera is directed at the portion of the web containing the bar-code and the bar-code is read by illuminating the web with a strobe light running in synchronism with the web. The output of the camera is fed to a decoder which decodes the bar-code and compares it with the previously stored code for the job.

If the bar-code does not match the stored code, say because an incorrect plate is present, an error signal is produced and the press is inhibited. However, if the bar-code does match the stored code the full print run can be commenced. This bar-code verification process has to be performed each time the press is started, and thus it is not possible to start productions with an incorrect plate in-situ.

The bar-code is based on the interleave 2 of 5 method used on airline tickets and the detector is able to tolerate wide variations in the spacing between the successive individual codes that form the bar-code, in order to allow for variations caused by plate or web movement and by reflectivity differences of the different constituent colours of the bar-code.

Preferably the apparatus is arranged to produce a certification signal at the start of every print run, in order to verify that the codes match. Verification may also occur whilst the press is running and a record of every check can be stored and/or printed out.

It is common for printers to produce labels which certify that the printed image is correct. These certification labels are adhered to the reels of printed packaging labels that are supplied to the product manufacturer. Preferably, the apparatus is arranged to produce the certification labels only when the bar-code is the same as the stored code for the job being printed.

tion mark that is printed onto the substrate, the apparatus further comprising monitoring means for monitoring the identification marks printed onto the substrate by each plate, memory means arranged to store the identification marks corresponding to the image intended to be printed, means for comparing the monitored marks with the stored marks and means for producing an error signal when the marks do not compare.

2. A printing apparatus as claimed in claim 1, in which the error signal is arranged to inhibit the press and/or produce an audible and/or visible alarm signal.
3. A printing apparatus as claimed in claims 1 or 2, in which the identification mark on each plate is arranged such that the printed marks form a series on the substrate.
4. A printing apparatus as claimed in claim 3, in which the series of marks form a bar-code.
5. A printing apparatus as claimed in claim 4, in which the monitoring means comprises a bar-code reader.
6. A printing apparatus as claimed in any of claims 1 to 3, in which the monitoring means comprises a video camera.
7. A printing apparatus as claimed in claim 6, in which the video camera is a monochrome video camera.

Claims

1. A printing apparatus comprising a printing press having a plurality of printing plates for printing respective portions of the image being printed onto a substrate, each plate carrying a unique identifica-

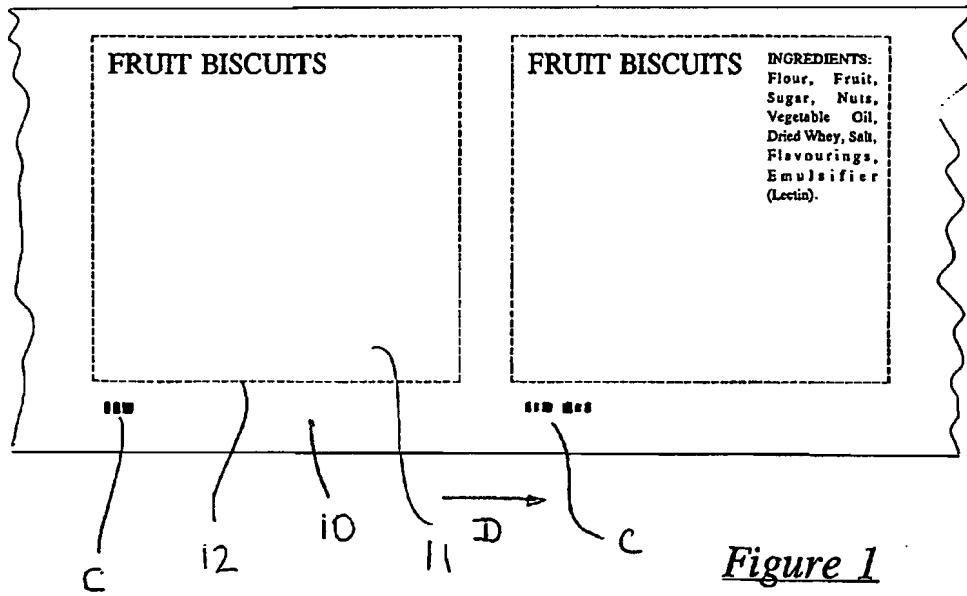


Figure 1

Character	Character	Plate 1	blue
	Character	Plate 2	d/blue
	Character	Plate 3	blue
Complete symbol	Character	Plate 4	d/blue
	Character	Plate 5	red
	Character	Plate 6	red
	Complete symbol		

Figure 2



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EUROPEAN SEARCH REPORT

Application Number
EP 98 30 5086

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 5 241 483 A (PORRET OLIVIER ET AL) 31 August 1993 * abstract; claims 1,3,10,11; figures * * column 3, line 22 - line 67 *	1-3,6,7	B41F33/00
A	US 5 056 430 A (BAYERLEIN FRIEDRICH K ET AL) 15 October 1991 * abstract; figures * * column 4, line 20 - column 5, line 25 *	1	
A	US 4 671 661 A (OTT HANS) 9 June 1987 * abstract; figures * * column 2, line 61 - column 3, line 53 *	4,5	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B41F
Place of search THE HAGUE		Date of completion of the search 6 November 1998	Examiner Helpiö, T.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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